



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/585,408

07/07/2006

Toshihisa Nozawa

33082M335

2529

441 7590 07/15/2008

SMITH, GAMBRELL & RUSSELL  
1130 CONNECTICUT AVENUE, N.W., SUITE 1130  
WASHINGTON, DC 20036

EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

07/15/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,408	<b>Applicant(s)</b> NOZAWA ET AL.	
	<b>Examiner</b> Keath T. Chen	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> .                                  | 6) <input type="checkbox"/> Other: _____                          |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :07/07/2006,09/29/2006,10/11/2006.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**1. Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Kenji (JP 02-055292, hereafter '292).**

'292 teaches all limitations of:

Claim 1: A substrate processing apparatus (Fig. 1) for processing a substrate (#3, Fig. 3, part that being omitted in Fig. 1) for manufacturing a semiconductor device, comprising an object (1A, reactor wall) to be cooled (English abstract, Constitution, lines 5-11), the apparatus further comprising: a mist generator (water #11, ultrasonic vibrator #13 and #12 container) that generates a mist (droplet #11A, line 11); a carrier-gas (#14) supply source that supplies a carrier gas for carrying the mist generated in the mist generator; and a mist passage (double wall between outlet tube #6 and inner wall #1, line 7) through which the mist carried by the carrier gas flows to cool the object.

Claim 2: The substrate processing apparatus according to claim 1, wherein the object is at least a part of a processing vessel (reaction vessel #7, line 12) in which a substrate received (#3, Fig. 3, part that being omitted in Fig. 1) therein is processed.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**2. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over '292, in view of Hiroyuki et al. (JP 2001-156047, hereafter '047).**

'292 teaches all limitations of claim 2, as discussed above. '292 further teaches the limitations of:

Claim 4: The substrate processing apparatus according to claim 3, further comprising a heater (high frequency power heater #5, Fig. 3, part that being omitted in Fig. 1, last paragraph of the upper left panel of page 2) that heats the object, at least when no plasma is generated.

'292 does not explicitly teaches the limitations of:

Claim 3: The substrate processing apparatus according to claim 2, wherein the substrate is processed in the processing vessel with the use of a plasma.

Claim 5: The substrate processing apparatus according to claim 2, further comprising a heating furnace that receives the processing vessel, wherein the mist passage is formed as a space defined between the processing vessel and the furnace.

'047 is an analogous art in the field of semiconductor manufacturing device, particularly in cooling body of a reaction chamber (English translation, [0001] field of the invention). '047 teaches a plasma ([0002], line 3, and the HF source at the bottom of Fig. 1) reaction chamber (#13, [0015], line 4) with nozzle (#19) to supply liquid refrigerant to the cooling passage/double wall ([0016]) between #13 and #13a in a misty state. '047 further teaches the outer wall embeds heating means ([0021]); therefore, outer wall #13 is a heating furnace that receives the processing vessel with mist passage in between the processing vessel and the furnace. '047 is silent on the details of the mist generation apparatus.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have added the mist generation apparatus (carrier gas, ultrasonic vibrator, and water) as taught in left hand side of Fig. 1 of '292 to the apparatus in Fig. 1 of '047.

The motivation to add mist generation apparatus is suitability for the purpose of '047 need for misty refrigerant. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

**3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over '292, in view of Seikyu et al. (JP 2003-174016, hereafter '016).**

'292 teaches all limitations of claim 2, as discussed above.

'292 does not explicitly teach the limitations of:

Claim 3: The substrate processing apparatus according to claim 2, wherein the substrate is processed in the processing vessel with the use of a plasma.

'016 is an analogous art in the field of plasma etching of semiconductor ([0001] and [0002]), particularly in cooling of a processed object (English translation, [0015]).

'016 teaches a plasma etching apparatus ([0001]) with mist generator (#115. [0039] and [0043]).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have replaced the mist generation apparatus (carrier gas, ultrasonic vibrator, and water) as taught in left hand side of Fig. 1 of '292 to the

apparatus in Fig. 1 of '016.

The motivation to replace the mist generation apparatus is suitability. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

**4. Claims 6-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over '292, in view of Seikyu et al. (JP 2003-174016, hereafter '016) and McMillen et al. (US 5316579, hereafter '579).**

'292 teaches all limitations of claim 1, as discussed above.

'292 does not explicitly teach the limitations of:

Claim 6: The substrate processing apparatus according to claim 1, further comprising: a temperature sensor that detects a temperature of the object; and a controller that controls the mist generator and the gas supply source, based on a temperature detected by the temperature sensor.

Claim 7: The substrate processing apparatus according claim 6, wherein the controller carries out a control operation to stop a generation of the mist by the mist generator and a supply of the carrier gas from the gas supply source, when the detected temperature of the temperature sensor is not more than a reference value.



Claim 9: The substrate processing apparatus according to claim 6, wherein the controller controls at least one of a flow rate of the mist and a flow rate of the carrier gas in the mist passage.

'016 is an analogous art as discussed before. '016 teaches a temperature sensor (#129, [0068]) that detect the temperature of the object/susceptor/electrode (#104); a controller/CPU (#131, [0069], line 2) that control the flow of mist/refrigerant regulating valve ([0069], line 2) based on the temperature measurement ([0069], line 1).

'579 is an analogous art in the field of liquid source CVD (field of the invention), particularly in generating fine mist (field of the invention). '579 also teaches temperature sensors and a controller (#136, Fig. 5, col. 10, lines 24-25) that control the manifold/mist and the gas (through valve #154), which is a carrier gas in Fig. 4.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have added a controller and temperature sensor to control the mist/refrigerant ([0070]), as taught by '016, and to control both the mist generator/manifold and carrier gas, as taught by '579, to the apparatus of Fig. 1 of '292.

The motivation to add temperature sensor and controller is to control the temperature of the object, as taught by '016 ([0069]). It is obvious to stop the generation

Art Unit: 1792

of the mist and carrier gas when the temperature is low (when there is not need of further cooling).

**5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over '292, '016, and '579, further in view of Moore et al. (US 20030161946, hereafter '946).**

'292, '016, and '579, together, teach all limitations of claim 6, as discussed above.

'292, '016, and '579, together, do not explicitly teach the limitations of:

Claim 8: The substrate processing apparatus according to claim 6, wherein the controller carries out a control operation to stop a generation of the mist by the mist generator, while continuing a supply of the carrier gas from the gas supply source, when the detected temperature of the temperature sensor is not more than a reference value.

'946 is an analogous art in the field of coating conduit (field of the invention), particularly in applying mist generator ([0037], 2nd last sentence). '946 teaches evacuation of cooling mist to avoid condensation ([0037], at bottom 2 lines of page 4 to the top 6 lines of page 5).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have turn off the mist generator while continuing a supply of

Art Unit: 1792

the carrier gas, as taught by '946, when the temperature of the sensor is below a reference value.

The motivation to continue supply of carrier gas is to avoid condensation, as taught by '946 ([0037], at bottom 2 lines of page 4 to the top 6 lines of page 5).

**6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '292, in view of Amai (US 20030034056, hereafter '056).**

'292 teaches all limitations of claim 1, as discussed above.

'292 does not teach the limitations of:

Claim 10: The substrate processing apparatus according to claim 1, further comprising a gas-liquid separator that separates the mist circulated in the mist passage from the carrier gas, and collects the separated mist as a liquid, wherein the mist generator generates the mist from the liquid collected by the separator.

'056 is an analogous art in the field of semiconductor processing (field of the invention), particularly in recovering the cleanness of the processing liquid for reuse ([0004], last sentence). '056 teaches mist-trap/gas-liquid separator (#132, Fig. 5, [0087]) and then reused (through pipe #134 and recovery path #137, [0111]).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to add a mist trap/gas-liquid separator, as taught by '056, to the apparatus in Fig. 1 of '292.

The motivation to add a gas-liquid separator is to recovering the clean liquid, as taught by '056 ([0004]).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./

Examiner, Art Unit 1792

/Ram N Kackar/

Primary Examiner, Art Unit 1792